

TECHNICAL REPORT



Activities and considerations related to wireless power transfer (WPT) for audio,
video and multimedia systems and equipment
(standards.iteh.ai)

IEC TR 62869:2013

<https://standards.iteh.ai/catalog/standards/sist/f759380c-8505-48da-8056-46169cdbf88/iec-tr-62869-2013>



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2013 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

Useful links:

IEC publications search - www.iec.ch/searchpub

The advanced search enables you to find IEC publications by a variety of criteria (reference number, text, technical committee,...).

It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available on-line and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

<https://standards.iteh.ai/catalog/standards/sist/f759380c-8505-48da-8056-46169cdbc88/iec-tr-62869-2013>

TECHNICAL REPORT



**Activities and considerations related to wireless power transfer (WPT) for audio,
video and multimedia systems and equipment**

STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/f759380c-8505-48da-8056-46169cdbc88/iec-tr-62869-2013>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE **XA**

ICS 29.240.99; 33.160.01

ISBN 978-2-8322-0926-4

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	9
2 Executive summary	9
2.1 Market.....	9
2.2 Technology.....	9
2.3 Regulation.....	9
2.4 Standards development.....	10
2.5 IEC TC 100 WPT technical standards development.....	10
3 Terms and definitions	10
3.1 Terms and definitions	10
3.2 Abbreviations	11
4 Market.....	13
4.1 Use cases	13
4.1.1 General	13
4.1.2 Vehicle	13
4.1.3 Commercial, institutional, retail.....	13
4.1.4 Residential	13
4.1.5 Professional office	14
4.1.6 Transportation and public spaces.....	14
4.1.7 Beyond mobile CE.....	14
4.2 Public benefit, including reduction in e-waste	14
4.3 Overview of products and services	16
4.3.1 Overview	16
4.3.2 Market segmentation	16
4.3.3 Market size.....	16
4.3.4 Geographic extent	16
4.3.5 Market participation	16
4.3.6 Current market technologies.....	16
4.3.7 Global industry engagement.....	17
4.3.8 By underlying technology.....	17
4.3.9 By product and use case	17
4.4 Research activities	20
4.4.1 Academic research	20
4.4.2 Market research and analysis	21
5 Technology.....	22
5.1 System reference model.....	22
5.2 The wireless power transfer layer	24
5.2.1 General	24
5.2.2 Electromagnetic induction.....	24
5.2.3 Magnetic resonance	25
5.2.4 Capacitive coupling	26
5.2.5 Microwave power transfer.....	26
5.2.6 Microwave energy harvesting	26
6 Regulation	27
6.1 Spectrum.....	27

6.2	RF emissions	28
6.3	Safety.....	28
6.3.1	General	28
6.3.2	RF exposure.....	28
6.3.3	Heating.....	30
6.3.4	Electrical safety	30
6.4	Compliance	30
6.4.1	Identified regulations and standards	30
6.4.2	Measurement methods	32
6.5	Impact of regulation.....	32
7	Technical standards development.....	32
7.1	General	32
7.2	Global survey industrial consortia.....	33
7.2.1	General	33
7.2.2	A4WP – Alliance for Wireless Power.....	33
7.2.3	CE4A – Consumer Electronics for Automotive	33
7.2.4	DE – Digital Europe	33
7.2.5	KWPF – Korea Wireless Power Forum.....	33
7.2.6	MFAN – Magnetic Field Area Network Forum	34
7.2.7	NFC Forum.....	34
7.2.8	PMA – Power Matters Alliance.....	34
7.2.9	WPC – Wireless Power Consortium	34
7.3	Global survey governmental and standards development organizations.....	35
7.3.1	General	35
7.3.2	APT – Asia Pacific Telecommunity.....	36
7.3.3	ARIB – Association of Radio Industries and Businesses	37
7.3.4	BWF – Broadband Wireless Forum	37
7.3.5	CCSA – China Communications Standards Association	39
7.3.6	CEA – Consumer Electronics Association	40
7.3.7	CJK – China, Japan and Korea Standards Coordination	40
7.3.8	ETSI – European Telecommunications Standards Institute	40
7.3.9	GSC – Global Standards Collaboration	41
7.3.10	IEC TC 100.....	41
7.3.11	ISO/IEC JTC 1.....	42
7.3.12	ITU-R	42
7.3.13	TTA – Telecommunications Technology Association.....	42
7.3.14	UL – Underwriters Laboratories	43
8	Review of WPT opportunities and challenges	43
8.1	General	43
8.2	Market.....	43
8.2.1	Interoperability	43
8.2.2	Use cases	44
8.3	Technology and technical standards development.....	44
8.3.1	Competing WPT technologies	44
8.3.2	Parallel efforts	44
8.3.3	Interoperability and multi-protocol support	44
9	Role for IEC TC 100	44
9.1	General	44
9.2	Market.....	44

9.2.1	Increase awareness and impact.....	44
9.2.2	Nomenclature harmonization	45
9.3	Technology.....	45
9.3.1	Technology taxonomy, use case and use case category harmonization.....	45
9.3.2	WPT classification	45
9.4	Regulation.....	45
9.4.1	General	45
9.4.2	Product categorization.....	45
9.4.3	Spectrum.....	45
9.4.4	RF emissions (EMI/EMC), RF exposure and regulatory engineering	45
9.5	Technical standards development	46
9.5.1	Framework of WPT standards.....	46
9.5.2	Interoperability	46
9.5.3	Minimum performance testing and certification	47
10	Summary and conclusions.....	47
	Bibliography.....	49
	Figure 1 – Automotive CE WPT products and concepts.....	18
	Figure 2 – CE WPT products and concepts.....	19
	Figure 3 – Professional office WPT products and concepts.....	19
	Figure 4 – Embedded WPT concepts for public spaces.....	20
	Figure 5 – WPT system reference model for single source single device.....	23
	Figure 6 – Electromagnetic induction.....	25
	Figure 7 – Magnetic resonance.....	25
	Figure 8 – Electric field inductive coupling	26
	Figure 9 – Microwave power transfer	26
	Figure 10 – Radio-exposure protection guidelines details (Japan).....	30
	Figure 11 – Regulatory, technical standards and implementation pipelines	36
	Figure 12 – Relationship between key Japan WPT technical standards stakeholders	38
	Table 1 – Academic-type research	20
	Table 2 – Market planning and analysis	21
	Table 3 – Operating frequencies and power limits.....	27
	Table 4 – GB8702-88 (China) basic restrictions	29
	Table 5 – GB 9175-88 (China) maximum permitted exposure.....	29
	Table 6 – Identified regulations and standards.....	31
	Table 7 – Alliance for Wireless Power (A4WP).....	33
	Table 8 – Consumer Electronics for Automotive (CE4A).....	33
	Table 9 – Digital Europe (DE)	33
	Table 10 – Korea Wireless Power Forum (KWPF).....	34
	Table 11 – Magnetic Field Area Network Forum (MFAN).....	34
	Table 12 – NFC Forum	34
	Table 13 – Power Matters Alliance (PMA).....	34
	Table 14 – Wireless Power Consortium (WPC)	35

Table 15 – Asia Pacific Telecommunity (APT).....	37
Table 16 – Association of Radio Industries and Businesses (ARIB).....	37
Table 17 – Broadband Wireless Forum (BWF)	39
Table 18 – China Communications Standards Association (CCSA)	39
Table 19 – Consumer Electronics Association (CEA)	40
Table 20 – China, Japan and Korea Standards Coordination (CJK).....	40
Table 21 – European Telecommunications Standards Institute (ETSI).....	41
Table 22 – Global Standards Collaboration (GSC)	41
Table 23 – IEC TC 100	41
Table 24 – ISO/IEC JTC 1.....	42
Table 25 – ITU-R	42
Table 26 – Telecommunications Technologies Association (TTA)	43
Table 27 – Underwriters Laboratories (UL).....	43

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

[IEC TR 62869:2013](#)

<https://standards.iteh.ai/catalog/standards/sist/f759380c-8505-48da-8056-46169cdbf88/iec-tr-62869-2013>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ACTIVITIES AND CONSIDERATIONS RELATED
TO WIRELESS POWER TRANSFER (WPT) FOR AUDIO,
VIDEO AND MULTIMEDIA SYSTEMS AND EQUIPMENT**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC 62869, which is a technical report, has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
100/2134/DTR	100/2166/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[IEC TR 62869:2013](#)

<https://standards.iteh.ai/catalog/standards/sist/f759380c-8505-48da-8056-46169cdbf88/iec-tr-62869-2013>

INTRODUCTION

IEC TC 100 established a Stage 0 project on wireless power transfer (WPT) to develop a technical report on WPT technical standardization in relation to audio, video and multimedia systems and equipment. A survey was developed to investigate the global positioning of the technology and its uptake. Twelve National Committees provided responses. Four National Committees (China, Japan, Korea, USA) provided responses to all questions. The key research undertaken and information gathered from the survey responses included: a) terms and definitions used for WPT by IEC TC 100 members; b) regulations, national laws, public policies and industry practices related to WPT; c) status of activities and discussions in various organizations relating to regulatory activities, standards projects, and market research; d) potential topics to be addressed in IEC TC 100 TR: and e) potential role for IEC TC 100 in the domain of WPT technical standards development.

This Technical Report combines survey results with Stage 0 project expert group contributions and extensive public information to develop and present a holistic understanding of WPT and, in so doing, respond to the Stage 0 TR objectives. This understanding is developed through a progression of four interrelated topics.

- Clause 4 considers the overall WPT market, including use cases, public benefit, academic research activities, and an overview of WPT products and services.
- Clause 5 discusses leading commercial WPT technical approaches and briefly surveys additional WPT technologies by reviewing a system reference model. The system reference model can be understood at a very high level as consisting of the lowest layer of a power handling layer, where upper layers implement signalling and systems interfaces.
- Clause 6 presents the major elements of the applicable international and regional regulatory frameworks, one of whose key outputs is product categorization. Product categorization, in turn, is closely related to the topic of spectrum. Key regulatory drivers for WPT products and services as well as technical standards development include RF emissions, RF exposure and compliance.
- Clause 7 reviews global industrial consortium and standards development organization (SDO) activities, and critically discusses WPT technical standard development challenges and opportunities.

With market, technology, regulatory and standards development foundations established, the TR concludes in Clauses 8-10 with observations and recommendations about the potential for future WPT technical standards development within the scope of IEC TC 100.

ACTIVITIES AND CONSIDERATIONS RELATED TO WIRELESS POWER TRANSFER (WPT) FOR AUDIO, VIDEO AND MULTIMEDIA SYSTEMS AND EQUIPMENT

1 Scope

This technical report addresses activities and considerations related to wireless power transfer for audio, video and multimedia systems and equipment. It combines public information, contributions by experts and completed IEC TC 100 WPT survey responses and reviews global market conditions. The TR describes a range of WPT technical approaches with the aid of a system reference model, outlines the impacts on WPT of applicable regulation and surveys standards development organization (SDO) and private industry consortium-led activities in support of WPT technical standards development. The TR concludes with observations and recommendations for potential future technical standards development activities that lie within scope of IEC TC 100.

2 Executive summary

2.1 Market

A variety of metrics indicate that the commercial market is in its early phases. Annual revenue projections range from a current level of a few hundred millions to some billions of dollars (US) by the 2016-2018 timeframe. Geographic coverage spans major markets in Asia, Europe and North America, and is expected to mirror the larger CE market. Market participants range from small, focused start-ups to the largest integrated global CE market leaders. Currently, market share, or market “excitement” may be characterized as being split amongst a few small companies, each with a proprietary solution, and a broader range of companies who have coalesced around private industry consortia, each of which is seeking to promote a particular technical approach.

2.2 Technology

Commercial application of WPT technology has its origins in the pioneering work of Nikola Tesla in the early 1900s and is already well-established in several industrial and specialized application areas, such as power supply to “people mover” systems in airports, material handling systems in manufacturing and warehousing, and “mission critical” control systems that isolate power supply from environmental disruption. Within the scope of IEC TC 100, a system reference model consists of one or more WPT “sources” and one or more WPT “sinks” that interact through a “coil subsystem.” This reference model captures commonalities and differences across the wide range of approaches already in the market, those expected to come to market in the near term and long-term prospective market entrants. The WPT technology environment today consists of multiple, largely non-interoperable approaches.

2.3 Regulation

The development of the WPT market is subject to applicable regulations. These serve the purpose of protecting people and services in the areas of safety, efficient use of spectrum, harmful interference and electromagnetic compatibility and immunity. WPT regulatory categorization sets the overall framework. Designs are subject to different regulations depending at least on WPT spectrum selection and signalling method. Categorization, in turn, drives RF exposure limits and highlights the importance of methods for demonstration of compliance. Currently, individual markets and regions have similar, but not uniform approaches. Policy development opportunities and challenges relate primarily to global harmonization as a means to promote technology innovation and market development.

2.4 Standards development

WPT technical standards development is an asynchronous global undertaking. Active programmes are underway at the international body level, the regional coordination level, the regional and national SDO level as well as within numerous global and regional private industrial consortia. While private industrial consortia typically focus on a single technical approach, the typical SDO WPT technical standards development programme allows parallel development of multiple technologies. Indeed, a multiplicity of WPT technical approaches are on parallel paths towards either de facto or formally approved WPT technical standards. In terms of productization in the medium term, it appears that multiple protocol support may substitute for true interoperability between competing technologies and standards.

2.5 IEC TC 100 WPT technical standards development

In terms of revenue, the largest market for WPT in the foreseeable future lies in the CE market, including audio, visual and multimedia systems and equipment. The WPT technology environment currently consists of multiple, non-interoperable technology approaches. This condition is perhaps not surprising given the range of identified use cases and power requirements (< 1W – 100W) relating to equipment within the scope of IEC TC 100. Thus, technical standards development within IEC TC 100 may be built around the concept of a framework of WPT standards. In such a concept, individual technical approaches enjoy the benefit of a globally harmonized standard. Technology selection proceeds through market-based mechanisms.

3 Terms and definitions

IEC STANDARD PREVIEW

3.1 Terms and definitions (standards.iteh.ai)

For the purposes of this document, the following terms and definitions apply.

[IEC TR 62869:2013](https://standards.iteh.ai/catalog/standards/sist/f759380c-8505-48da-8056-46169cdbc88/iec-tr-62869-2013)

<https://standards.iteh.ai/catalog/standards/sist/f759380c-8505-48da-8056-46169cdbc88/iec-tr-62869-2013>

3.1.1

capacitive coupling

method for wireless power transfer by means of capacitance between insulated electrodes

Note 1 to entry: Capacitive coupling is also referred to as "electric field coupling".

3.1.2

electromagnetic induction

class of methods used for wireless power transfer whose central principles are Faraday's Law and Lenz's Law

3.1.3

magnetic resonance

subset of electromagnetic induction methods utilizing non-radiative, near-field or mid-field resonance coupling between two electromagnetic resonators where the coupling coefficient between primary or source coil and secondary or receiving coil is low (k much less than 1)

Note 1 to entry: Magnetic resonance is also referred to as "loosely-coupled magnetic resonance", "highly resonant magnetic induction" and "magnetic resonant coupling".

3.1.4

tightly-coupled

subset of electromagnetic induction methods utilizing close physical proximity and optimal alignment between power providing and power receiving coils, where the coupling coefficient between primary or source coil and secondary or receiving coil is close to the achievable maximum (k very close to 1)

3.1.5**wireless power transfer**

method of non-contact energy delivery over time from one or more sources to one or more receiving units

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

A4WP	Alliance for Wireless Power
ACK/NACK	acknowledge/negative acknowledge
ANSI	American National Standards Institute
API	application programming interface
APT	Asia Pacific Telecommunity
ARIB	Association of Radio Industries and Businesses
AWG	APT Wireless Group
CATR	China Academy of Telecommunications Research
BWF	Broadband Wireless Forum
CCSA	China Communications Standards Association
CE	consumer electronics
CE4A	Consumer Electronics for Automotive
CEA	Consumer Electronics Association
CEC	California Energy Commission
CENELEC	European Committee for Electrotechnical Standardization
CPT	contactless power transfer
CS	control and signaling
DE	Digital Europe
DG	Drafting Group
DTBC	device to be charged
EC	European Commission
EMC	electromagnetic compatibility
EMI	electromagnetic interference
EPA	Environmental Protection Agency (USA)
EPS	external power supply
ETSI	European Telecommunications Standards Institute
EU	European Union
EV	electric vehicle
FCC	Federal Communications Commission
GSMA	GSM Association
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEC	International Electrotechnical Commission
ISM	industrial, scientific and medical
ISO	International Standards Organization
ITU	International Telecommunication Union
ITU-R	ITU Radiocommunication Sector
ITU-T	ITU Telecommunication Sector
JEITA	Japan Electronics and Information Technology Industries Association
JSAE	Society of Automotive Engineers of Japan

KATS	Korea Agency for Technology and Standards
KCC	Korea Communications Commission
KDB	Knowledge Database (USA FCC)
KETI	Korea Electronics Technology Institute
KWPF	Korea Wireless Power Forum
METI	Ministry of Economy, Trade and Industry, Japan
MFAN	Magnetic Field Area Network Forum, Korea
MHLW	Ministry of Health, Labour and Welfare, Japan
MIC	Ministry of Internal Affairs and Communications, Japan
MKE	Ministry of Knowledge Economy, Korea
MLIT	Ministry of Land, Infrastructure, Transport and Tourism, Japan
MOU	memorandum of understanding
MRM	Electronic Manufacturers Recycling Management Company
NA	not applicable
NFC	near-field communication
NWIP	new work item proposal
OEM	original equipment manufacturer
PBA	permit but ask
PCG	Project Coordination Group
PID	proportional integral differential
PMA	power matters alliance
PT	power transfer
RMS	root mean square IEC TR 62869:2013
RoHS	restriction of hazardous substances
SAR	specific absorption rate
SDO	standards development organization
SIG	special interest group
SoC	system on chip
TA	technical area
TCAM	Telecommunications Conformity Assessment and Market Surveillance Committee
TIA	Telecommunications Industry Association
TMC	Telecomms Metrology Center
TR	technical report
TTA	Telecommunications Technology Association
UL	Underwriters' Laboratories
USA	United States of America
WCS	wireless charging system
WEEE	Waste Electrical and Electronic Equipment Directive
WG	working group
WPC	Wireless Power Consortium
WPT	wireless power transfer
YRP	Yokosuka Research Park

4 Market

4.1 Use cases

4.1.1 General

A broad range of WPT applications or use cases are unified under the vision of ubiquitous power. The breadth of applications is quantified in terms of device characteristic power requirement. These range from the < 1 W (e.g., cellular telephone headset), to < 10 W (e.g., feature phone or smartphone), to < 20 W (e.g., tablet or notebook) to < 50 W (laptop), and so on, up to kW levels (e.g., electric vehicles). As it relates to battery-powered, mobile, handheld CE devices for audio, video and multimedia equipment, ubiquitous power simply means that increases in device functionality and a resulting need for greater power are growing faster than advances in power storage capacity. The result is that devices require more frequent recharging. Ubiquitous power means that users can reliably recharge anywhere, anytime without the constant burden of carrying and deploying battery charging accessories and equipment.

The vision of anywhere, anytime recharging depends upon WPT integration in the physical environment. A multiplicity of independent market analysis firms, private industrial consortia, SDOs and related task groups and academic studies have surveyed or analysed user battery charging requirements and behaviour. Such endeavours, in combination with net utility analyses, resulted in categorization of WPT use cases into those described below in subclauses 4.1.1 to 4.1.6.

A common requirement across use cases is that WPT not disrupt normal device performance and not negatively impact the nominal functionality of the infrastructure where it is installed (e.g., a table with integrated WPT still functions well as a table, a car operates as a normal car, etc.)

[IEC TR 62869:2013](https://standards.iteh.ai/catalog/standards/sist/f759380c-8505-48da-8056-46169cdbf88/iec-tr-62869-2013)

4.1.2 Vehicle <https://standards.iteh.ai/catalog/standards/sist/f759380c-8505-48da-8056-46169cdbf88/iec-tr-62869-2013>

As distinct from electric vehicle (EV) charging, automotive CE-type WPT refers to the ability to charge occupants' CE devices during operation of the automobile. Such capabilities may be implemented either on a retro-fit or embedded basis. Target vehicles include personal cars, SUVs, minivans, trucks, vans, buses, trams and shared cars.

4.1.3 Commercial, institutional, retail

Commercial, institutional, and retail may take a form comparable to that of the stereotypical café occupant who utilizes complimentary local area network connectivity. Concretely, a cloud-based service operating in conjunction with a CE device-based discovery mechanism to learn of charging locations could lead the user to a café table or kiosk with embedded WPT capability. Additional examples include WPT-enabled hotel rooms, restaurant table tops and shopping mall kiosks. In these environments, the CE device owner chooses from what is made available by those managing those environments.

4.1.4 Residential

For the typical user, the home or private residence usually represents the primary charging location. This use case requires a variety of WPT sources for the home offering consumers a choice of appearance and cost. Examples may include WPT embedded in bedside stands, entry hall WPT-enabled dishes or bowls, and more purely functional WPT-enabled chargers for the study or garage. A key element in this use case is that the individual consumer controls his or her own WPT sources or "infrastructure" and the selection appropriate to their WPT device(s).